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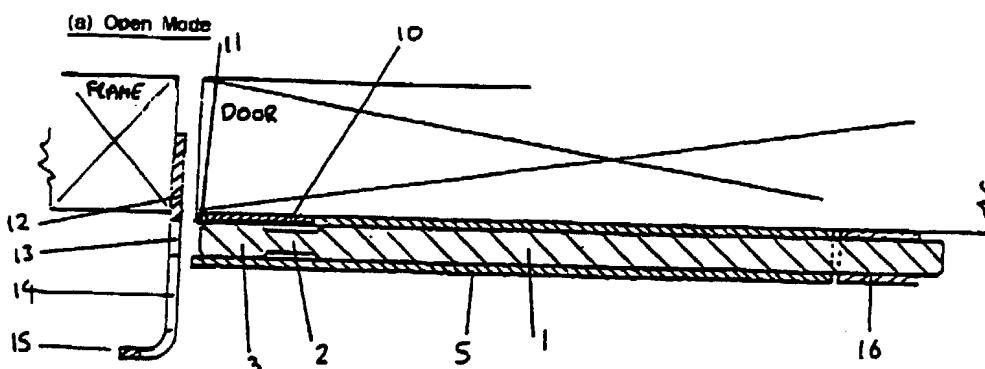
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(54) Security device

(57) A security device for securing an opening member, for example a door or a window, in relation to a fixed member. The device has a bolt 1 which is pivotally and slidably connected to a opening member via an attachment means 5. A front bracket 12 is provided on the fixed member and has an engagement hole 13 for receiving the bolt 1. Securing means is provided for securing the bolt 1 in relation to the opening means, the securing means being in the form of a rear bracket 16. The security device has three positions: a locked position in which the device locks the opening member closed in relation to the fixed member by the bolt engaging both the securing means and the bracket (Fig 2b); a limiting position in which the device allows the opening member to open a limited distance from the fixed member by the bolt engaging the bracket but not the securing means allowing the bolt to pivot and slide in relation to the opening member (Fig. 2c); and an open position in which the bolt disengages the bracket thereby allowing the opening member to open fully away from the fixed member.

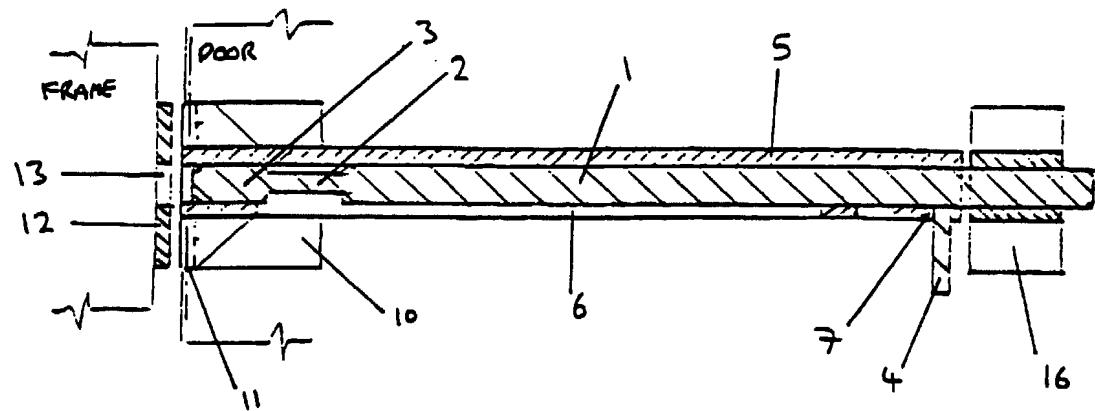
Figure 2.



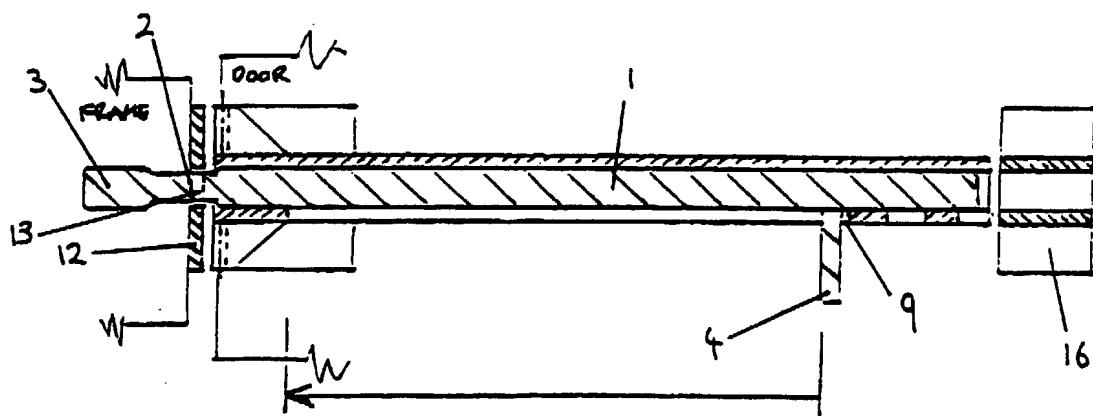
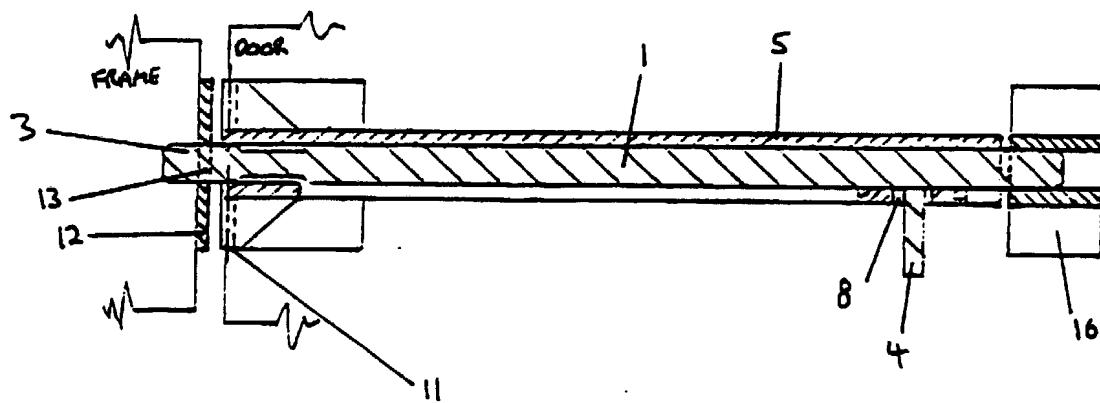
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(a) Open Mode



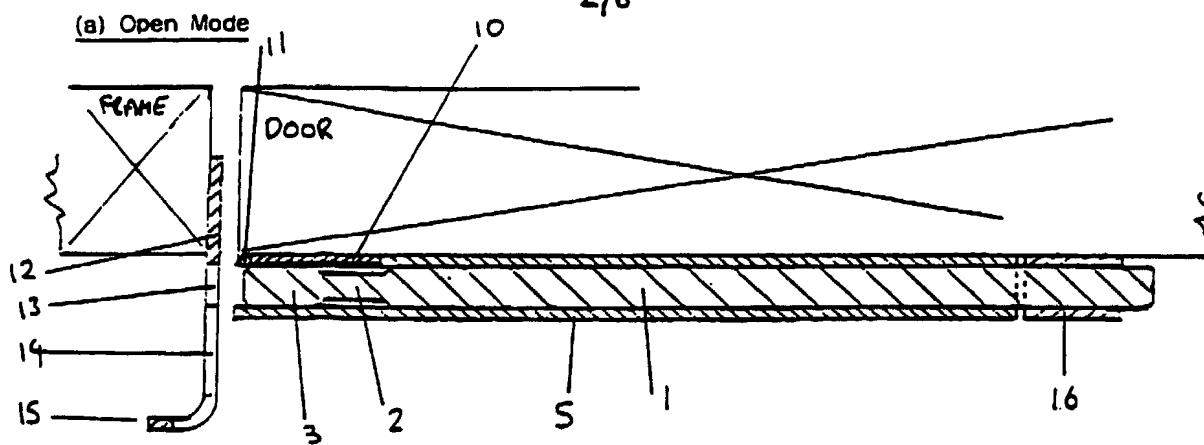
(b) Closed Mode



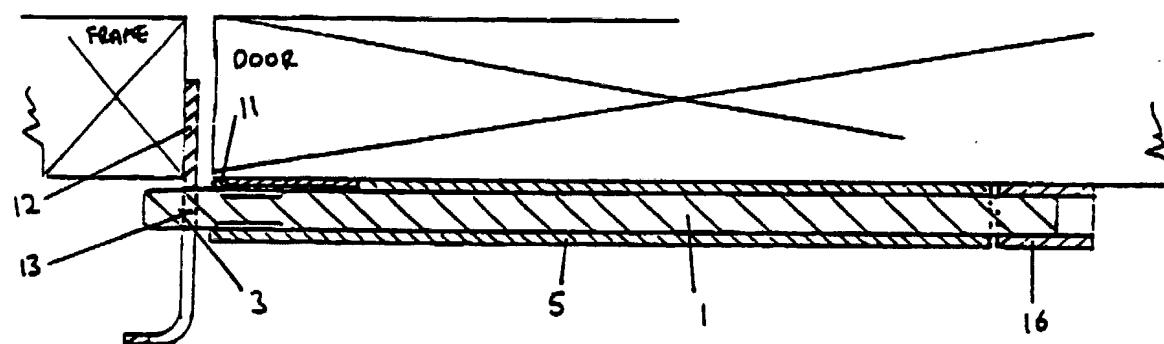
(c) Limiting Mode

Figure 1.

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(b) Closed Mode



(c) Limiting Mode

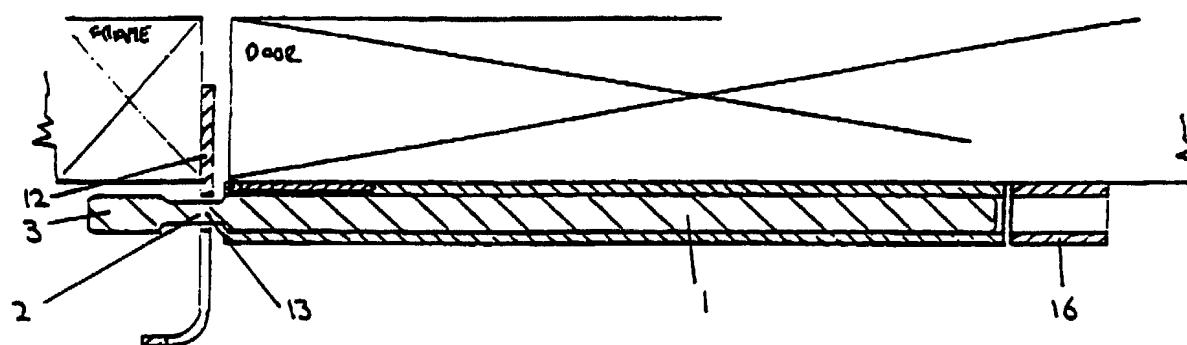


Figure 2.

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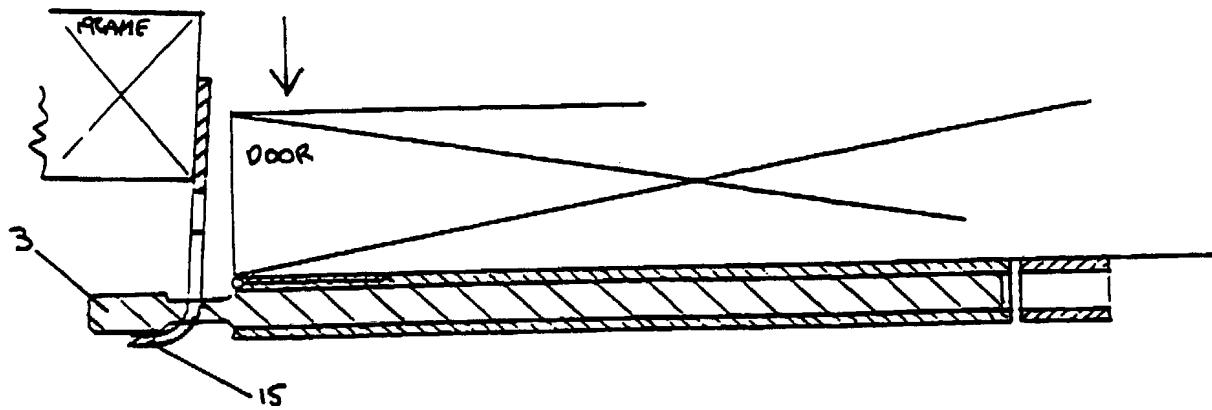


Figure 3.

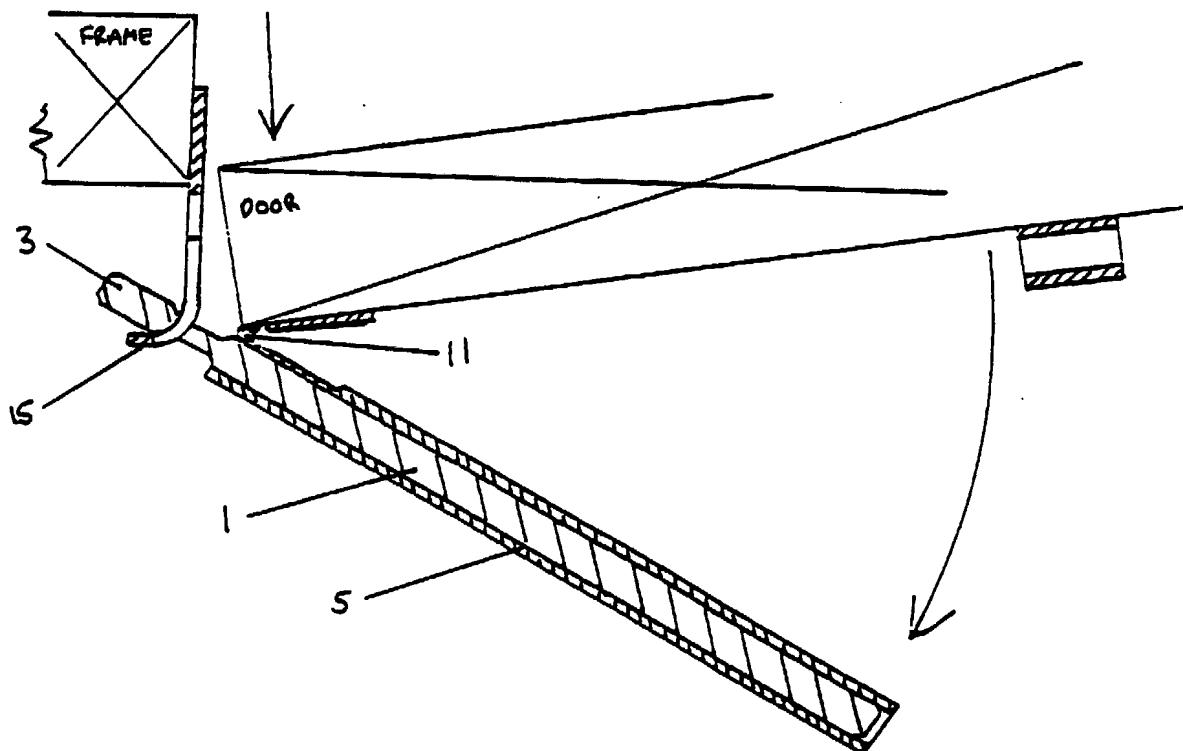
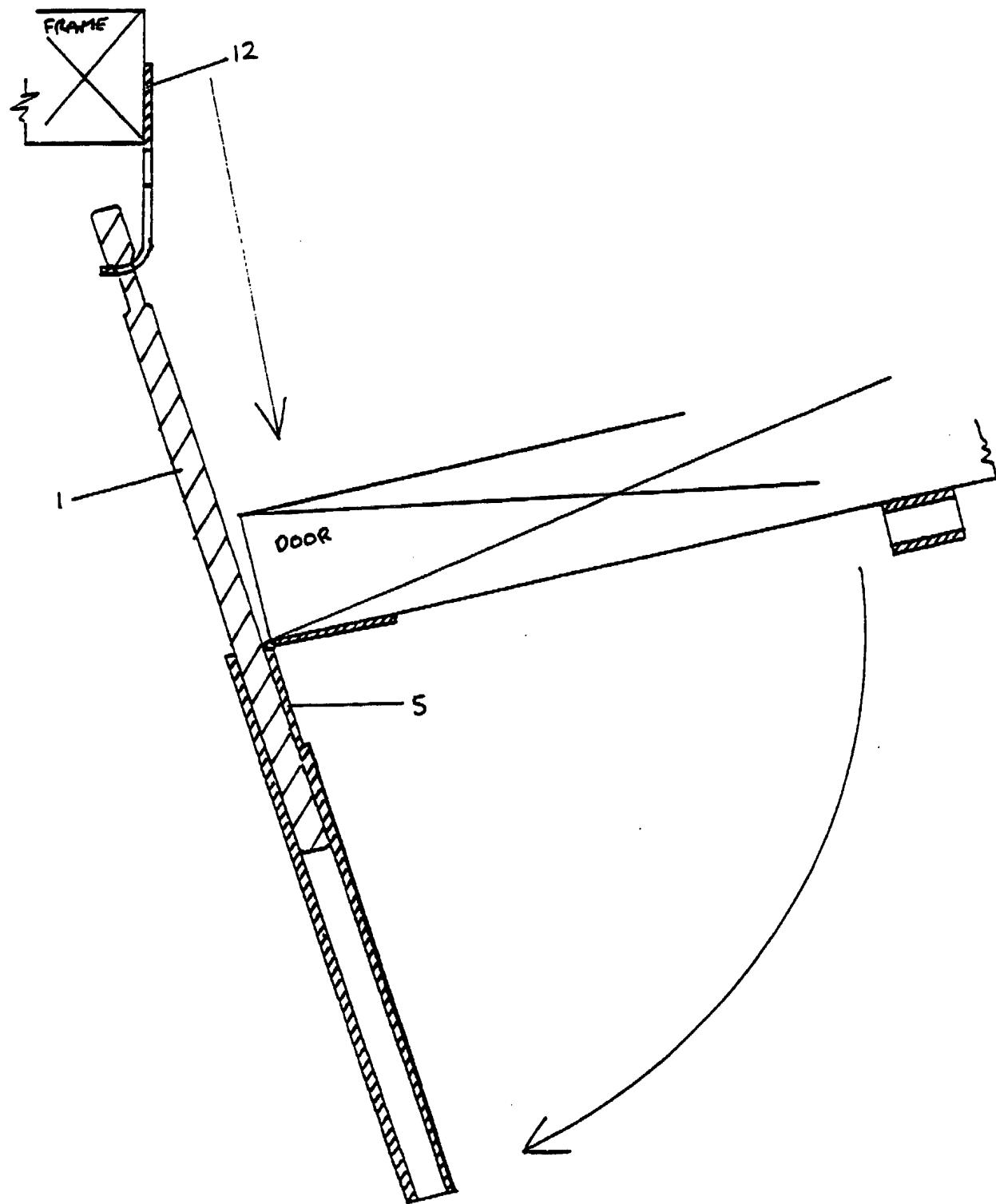


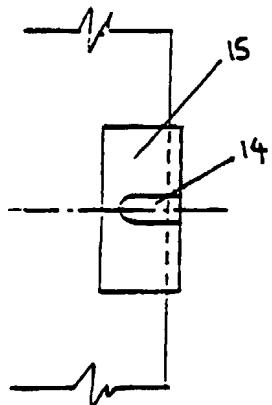
Figure 4.

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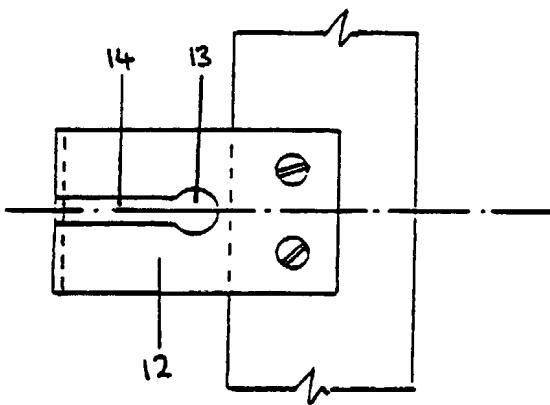
Figure 5.



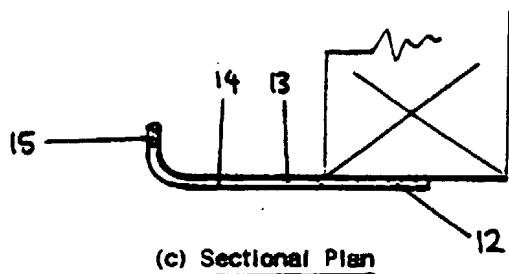
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(a) Inside Elevation



(b) Side Elevation



(c) Sectional Plan

Figure 6.

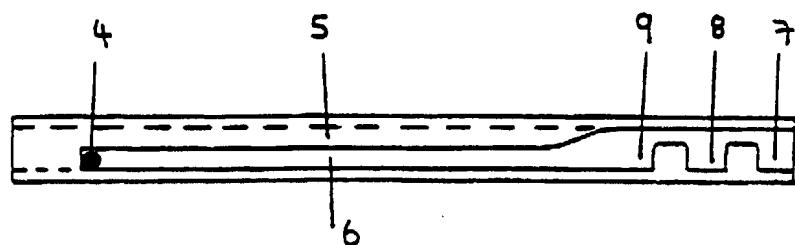
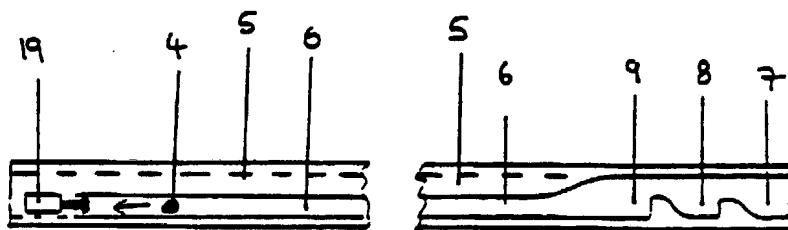
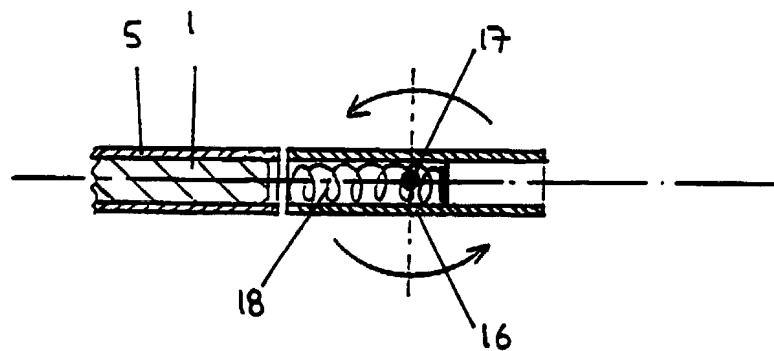


Figure 7.

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Figure 8.



(a) with End Stop Switch

(b) with Cut-Outs adapted to suit
Rejector Spring option.

Figure 9.

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SECURITY DEVICE

This invention relates to a mechanical device attached to the inside of a door to form a means of securing the door in it's closed position and preventing it being opened, hereinafter referred to for convenience as locked mode. It may also allow the said door to be opened by an amount limited by the device and then being secure against further opening movement, hereinafter referred to for convenience as limiting mode. With the door in it's closed position the device may be arranged in such a way as to allow the door to be opened fully hereinafter referred to for convenience as open mode, however, this will only be possible under normal operation when the door is in it's closed position. A modification of the device allows the limiting mode to be reset automatically each time the door is closed by a person on the inside of the door.

A typical application for such a device is to allow the door to be partially opened by a person on the inside in order to view/speak to/obtain identification/etc. from any person(s) on the outside of the door whilst preventing the door from opening sufficiently to allow them access, i.e. gives security. It could also be used on opening windows to allow them to be opened sufficiently for ventilation purposes, but not sufficient to allow an intruder access.

The following definitions shall hereinafter be referred to for convenience:

Door, meaning any opening panel (including windows) to which the device may be attached.

Inside, meaning device side of the door i.e usually inside the building/house to which the door gives access.

Frame, meaning fixed door surround.

Opening edges of door, meaning any of the three sides of the door which open out from the frame when the door is opened (i.e. not the hinged edge).

Conventional means of such door opening restriction are currently available. These most frequently take the form of:

- (I) A chain attached to the frame that passes through a bracket attached to the door which limits the extent of door opening by the length of the chain. The chain being adapted so that it can be engaged and disengaged only when the door is closed.
- (II) Hinged rod arrangement attached to the frame that interacts with a bracket on the door, again, to limit the extent the door can be opened by the length of the rod.
- (III) Roller cam type mechanism attached to the bottom of the door that prevents further door movement once actuated by the door operator.

These generally have the disadvantage that they:

- (i) do not generally allow automatic reset of limiting mode which is useful when, say, children/elderly people open the door who are inclined to forget to utilise such devices when answering the door.
- (ii) can be unsightly.
- (iii) noisy in operation (i.e.chains).
- (iv) requires a suitable space on the frame adjacent to the door for the fixing and storage of the mechanism/chain, often the available space is insufficient for this purpose.
- (v) do not generally lock the door, if necessary, when closed.
- (vi) some types require actuation when the door is being opened and therefore may be difficult for some people to operate, especially when the door is forced quickly (i.e.roller cam).
- (vii) Chains may be readily cut with croppers.

It is an aim of this invention to utilise a mechanical device that will provide a means of limiting the extent to which a door can be opened and may be readily adjusted so as to lock the door in it's closed position or adjusted to allow it to fully open.

It is a further aim of this invention that it may require a relatively narrow space on the inside face of the frame for it's fixing and operation. It may also be located horizontally or vertically on any of the three opening sides of the door, i.e. if located vertically at the top of the door it may be utilised in situations where there is no suitable space on the frame adjacent to the opening side of the door for a security device. It is yet a further aim of this product that this mechanical device may be adapted to provide automatic engagement into the door limiting position if necessary each time the door is closed by a person on the inside of the door.

According to this invention the device comprises an elongate rod of circular, square, rectangular or other substantially prismatic form, hereinafter referred to as the bolt, slideably connected to a retainer which is attached in proximity to an opening edge of the door in such a way that it allows rotation of the bolt/retainer assembly about an axis substantially parallel and in close proximity to this opening edge of the door, brackets into which the bolt may engage are provided one attached to the door at the end of the bolt remote from the said door opening edge, hereinafter known as the rear bracket, and another on the frame, hereinafter known as the front bracket, the bolt/retainer assembly and brackets are arranged in such a way that when the longitudinal axis of the bolt is substantially parallel to the plane of the door and the door is closed the bolt may co-operatively engage in either front or rear bracket or both brackets co-incidently by slideably adjusting the position of the bolt, the assembly is arranged in such a way that when the bolt is engaged in the rear bracket and not engaged in the front bracket the door may be fully opened, when the bolt is engaged co-incidently in both brackets the door may not be opened and when the bolt is located in the front bracket and not the rear bracket the door may open where such engagement with the front bracket causes the bolt/retainer assembly to rotate about it's hinged axis as the door is opened and the bolt moves in an axial direction through the retainer until further relative bolt/retainer movement is prevented by interference between the bolt and retainer i.e. the door may be opened no further.

Specifically, the bolt may have the open, closed and limiting mode positions readily defined on the retainer, for example a projection attached perpendicular to the axis of the bolt which engage slots or cut-outs in the retainer at the required bolt positions. This bolt projection may also be utilised to prevent further axial motion of the bolt in the retainer in the limiting mode once the door has undergone the predetermined extent of opening i.e. further opening movement is prevented.

Specifically, if the device is fixed vertically, i.e. at the top of the door, a secondary means of rotation of the bolt/retainer assembly perpendicular to the longitudinal axis of the bolt and perpendicular to the retainer rotation axis may be required in order to maintain alignment of the axis of the bolt with the point of engagement on the front bracket as the door is opened i.e. as the angle between the door and frame increases as the door opens, so the axial direction of the bolt if fixed perpendicular to the opening edge of the door will become increasingly non-coincident with the engagement position on the front bracket.

According to another aspect of this invention the rear bracket may be readily adjusted so that axial movement of the bolt into engagement with the rear bracket is resisted by a spring element and the bolt/retainer assembly may be arranged in such a way that engagement with the front bracket and not the rear bracket always occurs when the door is in its closed position.

Specifically, upon closing the door and the person operating the door on the inside releasing the device, the bolt will automatically, under spring action, engage the front bracket sufficiently (and not the rear bracket at all) to provide limiting mode operation, unless the person operating the door on the inside adjusts the bolt into the open mode whilst the door is in the closed position and holds it in this position in order to open the door.

According to yet another aspect of this invention, the bolt element has provided at the end nearest the front bracket a length of the bolt of differing cross section relative to the remainder of the bolt for the purpose of secure engagement in the front bracket. The front bracket is of such arrangement as to allow the section of bolt of differing cross section to be accommodated by it in the limiting mode and when the door is opened the bolt undergoes relative movement with the bracket into a position which does not allow the bolt to be withdrawn from the front bracket.

Specifically, a bolt of, say, cylindrical form may have provided along the length of the bolt and located at one end towards the front bracket a short length of smaller diameter between adjacent lengths of bolt of "standard" diameter, i.e. the diameter of the remainder of the bolt. The front bracket incorporates an engagement hole which is in co-axial alignment with the bolt when the door is closed and with the bolt substantially parallel to the plane of the door. This front bracket also incorporates a slotted hole perpendicular to the door frame the axis of which is co-incident with the axis of the engagement hole and is integral with the engagement hole and also positioned adjacent to the hole at it's furthest point from the frame. The width of the slotted hole being larger than the reduced bolt diameter, but smaller than the remainder of the bolt diameter.

The front bracket may also incorporate at it's end remote from the door frame a means of providing a change of direction of the slotted hole about an axis generally parallel with the door frame to which it is attached and generally of 90° away from the door, i.e. a bend in the bracket, after which the slotted hole is terminated within the bracket, i.e. the slotted hole passes around the bend but terminates before the end of the bracket.

With the bolt in it's closed position, the end of the bolt of standard diameter is engaged in the engagement hole in the front bracket. This cannot, however, pass along the slotted hole if an attempt is made to open the door as it's diameter is larger than the width of the slotted hole. Also, the other end of the bolt is in engagement with the rear bracket, thus preventing the device rotating about it's hinged axis, therefore the door cannot be opened, i.e. the device acts in a similar fashion to a conventional door bolt.

When limiting mode is engaged the axial movement of the bolt through the front bracket (i.e. away from the door) causes the section of bolt of reduced diameter to be co-incidently aligned with the plane of the front bracket. The other end of the bolt is now also disengaged from the rear bracket whilst in this mode, i.e. the device is now able to rotate about it's hinged axis. Therefore, when the door is opened this section of bolt of reduced diameter is allowed to pass perpendicular to it's longitudinal axis along the slotted hole until the bolt makes contact with the bent outer end of the front bracket, at this point as this end of the bolt is restrained from further outward movement by the front bracket the bolt/retainer assembly rotates about it's hinged axis with further opening movement of the door.

As the door continues yet further opening movement and the bolt is prevented from further outward movement by it's engagement with the front bracket, the retainer assembly, which is attached to the door, moves with it and therefore undergoes relative co-axial movement with the bolt. When the interrupting stop on the bolt is reached further axial movement is prevented and therefore the door cannot be opened further.

The device cannot be disengaged whilst the door is being opened in limiting mode as the end of the bolt is of larger diameter than the slotted hole and therefore cannot pass back through the front bracket. Also, the angle of the axis of the bolt to the front bracket when the door is partially opened prevents disengagement via the engagement hole of the bolt from the front bracket.

The device may be further modified by incorporating an electrical switch, or other switching device, which could be used to activate an alarm once a predetermined force is applied to the device whilst in the limiting mode and the door at it's limited extent of opening, i.e. if forced entry is attempted.

A security device constructed in accordance with the invention will now be described by way of example only, together with examples of alternatives and adaptations, with reference to the accompanying drawings in which:

Figure 1 are sectional elevations of the device; (a) open mode
(b) closed mode
(c) limiting mode

Figure 2 are sectional plans of the device; (a) open mode
(b) closed mode
(c) limiting mode.

Figure 3 is a sectional plan of the device in limiting mode with the door beginning to open.

Figure 4 is a sectional plan of the device in limiting mode with further door opening movement.

Figure 5 is a sectional plan of the device in limiting mode with the door open to almost it's full limited extent.

Figure 6 are front bracket details; (a) inside elevation
(b) side elevation
(c) sectional plan.

Figure 7 is an external view of the slotted hole in the retainer body with the limiting mode stop handle at the extent of limited door opening.

Figure 8 is a sectional elevation of the rear bracket adapted to incorporate a rejector spring for limiting mode only option; and

Figure 9 is an external view of the slotted hole in the retainer with:
(a) end stop switch
(b) cut-outs adapted to prevent open or closed mode engagement when limiting mode only option is selected.

In this example the term "front" refers to the direction from the door towards the door frame adjacent to the open edge of the door. Conversely, "back" refers to the opposite direction, i.e. toward the door hinges.

Referring to the drawings, the bolt 1 is formed from cylindrical bar, see Figure 1, with a relatively short portion of the bolt being of reduced diameter 2 located near the front end of the bolt. The front end of the bolt 3 is of the same diameter as the remainder of the bolt, i.e. referred to as "standard diameter". The bolt also incorporates, towards the rear, a projection 4 which acts as both the mode selector handle and limiting mode axial movement stop.

The bolt 1 is housed within a retainer 5 which has a cylindrical inner bore of such diameter as to allow slideable movement of the bolt 1 axially along this bore. The retainer 5 incorporates a slot 6 into the cylindrical inner bore and extending the length of the retainer and along which the handle 4 may slide, Figure 7. At the rear end of the retainer, cut-outs in the slot 6 in which the handle 4 may be located provide the means of engaging the bolt in the predetermined positions, i.e.:

Figure 1(a) shows the bolt in open mode and the handle 4 is engaged in the rear cut-out 7.

Figure 1(b) shows the bolt in closed mode and the handle 4 is engaged in the middle cut out 8.

Figure 1(c) shows the bolt in limiting mode and the handle 4 is in the limiting mode position 9.

The retainer is attached at its front end to the door using attachment plate 10 which is rigidly connected to the door using screws or other means. The attachment plate 10 is attached to the retainer 5 via a hinge 11, the axis of this hinge being generally parallel to the opening edge of the door. The position of the retainer hinge 11 relative to the opening edge of the door can be important for the correct operation of the device, i.e. If the hinge is too far back the bolt 1 may impinge upon the door during operation. Conversely, if too far forward the retainer 5 will impinge upon the front bracket 12 when the door is closed.

The front bracket 12 is formed of plate and is rigidly connected to the door frame

using screws or other means. Referring to Figure 6 the front bracket 12 incorporates an engagement hole 13 of such diameter as to allow the front of the bolt of standard diameter 3 to pass through it. The centre of this hole, when the front bracket is attached to the door frame, must generally be in alignment with the axis of the bolt 1 when the axis of the bolt is generally parallel with the plane of the door and the door is closed. The front bracket 12 also incorporates a slotted hole 14, this being generally perpendicular to the opening edge of the door and is axially aligned with the engagement hole 13 and also extends into this hole. This slotted hole 14 is of sufficient width as to allow the bolt section of reduced diameter 2 to pass along it and is also sufficiently narrow so as to not allow the bolt of standard diameter 1 or 3 to be able to pass through it or along it.

The end of the front bracket 12 furthest from the door frame undergoes a 90° bend 15 away from the door, around this bend 15 the slot 14 continues, this slot is terminated before the end of the bracket.

The rear bracket 16 comprises a hollow body which may accommodate the bolt 1 and is attached to the door by, for example, utilising a fixing plate or other means. This rear bracket 16 is positioned on the door so that the rear end of the bolt 1 may be slid backwards through the retainer 5 and into engagement with this bracket 16 when the axis of the bolt is generally parallel with the plane of the door.

Referring to Figures 1 & 2, the device as described is operated in the following manner:

Figures 1(a) and 2(a) show the bolt in it's open position and the handle 4 corresponds to the rear most cut-out 7. The rear of the bolt 1 is engaged in the rear bracket 16 and the front of the bolt 3 is not engaged in the front bracket 12. In this position the bolt/retainer assembly 1/5 is held in position parallel to the plane of the door and the door is free to open.

Figures 1(b) & 2(b) show the bolt 1 in it's closed position, i.e. the bolt 1 in it's closed position and the handle 4 corresponds with the middle cut-out 8. The rear of the bolt 1 remains engaged in the rear bracket 16, however, the front of the bolt 3 is engaged in the engagement hole 13 of the front bracket 12. In this position the bolt/retainer assembly 1/5 is again held in position with the axis of the bolt parallel to the plane of the door, i.e. the retainer is prevented from rotation about it's hinge 11 due to the bolt 1 being in engagement with the rear bracket 16. As the front of the bolt 3 is engaged in the front bracket 12, and is too large to slide along the slotted hole 14, the door cannot be opened, i.e. the device has secured the door in a similar manner to a conventional door bolt.

Figures 1(c) & 2(c) demonstrate the bolt in it's limiting mode position. The bolt 1 is now further forward and it's handle 4 corresponds with the limiting mode position 9. The rear of the bolt 1 is now disengaged from the rear bracket 16 and the front of the bolt 3 passes through the front bracket 12 so that the narrower section of bolt 2 is within the engagement hole 13. When the door is now opened the narrow section of bolt 2 passes along the slotted hole 14, see Figure 3, until the end of the bolt 3 makes contact with the bend 15 in the front bracket 12. Referring to Figure 4, upon further opening of the door as the end of the bolt 3 is restricted from further outward movement by the end of the front bracket 15, the bolt/retainer assembly 1/5 rotates about it's hinged axis 11.

With continued opening movement of the door, Figure 5, the bolt 1 cannot undergo outward movement as it is restrained by the front bracket 12, however, the retainer 5, which is attached to the door, slides axially along the bolt 1 with this movement of the door. At the same time handle 4 slides along the retainer slotted hole 6, i.e. the arrangement of the slot 6 is such that when in the limiting mode, position 9, the handle 4 must be able to slide from this position along the slotted hole 6. Further axial movement is prevented when the bolt handle 4 reaches the end of the slot 6 which is terminated before the end of the retainer body, see Figure 7. At this point the door can be opened no further, i.e. the extent of door opening is limited.

Upon closing the door the reverse of the above procedure takes place i.e. as the bolt body 1 cannot pass through the slotted hole 14 in the front bracket 12 this causes the bolt 1 to slide axially into the retainer and the bolt/retainer assembly 1/5 to rotate about the hinge 11 to it's original limiting mode position i.e. with the axis of the bolt 1 parallel with the plane of the door, as the door is closed.

When the door is closed and the axis of the bolt 1 parallel with the plane of the door the bolt 1 may then be slid back into either the closed or open mode positions.

An adaptation of the above would be to include a switch 19 at the front end of the retainer slot 6 so that when the device has reached the extent of it's travel, the handle 4 makes contact with this switch, Figure 9. A predetermined pressure would cause the switch to operate, i.e. an alarm could be activated if an attempt was made to force the door whilst partially open in limiting mode.

A further modification is demonstrated in figure 8, the rear bracket 16 is attached to the door via a pivot 17 which allows it to rotate. One end of the bracket is as previously described above. The opposite end contains a spring element 18. When this spring position is selected by rotating the bracket through 180° from the previous position, any attempt to slide the bolt 1 back further than the limiting mode position will cause the spring element 18 to eject the bolt 1 from the rear bracket 16, i.e. the device in this position can only remain in limiting mode. This can, however, be overridden, if necessary, by pulling the bolt 1 back against the spring element 18 until the open mode position is reached, whereupon the door may be opened. This is useful should the door be operated by, for example, very old people or young children who may be vulnerable to intruders and yet may often forget to engage and use other such security devices. For this adaptation to be effective it will be necessary to not allow the handle 4 to engage in the cut-outs 7 and 8 in such a way that it will prevent the spring element 18 from returning the bolt element 1 to the limiting mode position, Figure 9.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

CLAIMS:

1. A security device for securing an opening member in
5 relation to a fixed member, comprising:

a bolt;

an attachment means for attaching the bolt in
pivotable and slidable attachment to the opening member;

10 a bracket attached, in use, to the fixed member which
is adapted to pivotally receive a first end of the bolt; and

15 a securing means for selectively securing the bolt to
prevent the bolt from pivoting in relation to the opening
means;

wherein the security device has: a locked position in
15 which the device locks the opening member closed in relation
to the fixed member by the bolt engaging both the securing
means and the bracket; a limiting position in which the
device allows the opening member to open a limited distance
from the fixed member by the bolt engaging the bracket but
20 not the securing means thereby allowing the bolt to pivot
and slide in relation to the opening member; and an open
position in which the bolt is disengaged from the bracket
thereby allowing the opening member to open fully away from
the fixed member.

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2. A security device as claimed in claim 1, wherein the
attachment means has locating positions for the bolt
corresponding to the locked, limiting and open positions.

30 3. A security device as claimed in claim 2, wherein the
bolt has a projection which projects from the bolt
perpendicular to the axis of the bolt, the projection
engaging with the locating positions on the attachment
means.

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4. A security device as claimed in any one of claims 1
to 3, wherein the attachment means telescopically receives
the bolt.

5. A security device as claimed in any one of the preceding claims, wherein the securing means is fixedly attached, in use, to the opening means and forms an aperture in which the bolt can be received.

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6. A security device as claimed in any one of the preceding claims, wherein the bracket has an engaging hole and a reduced diameter slot extending from the hole.

10 7. A security device as claimed in claim 6, wherein the bolt has a portion of reduced thickness which fits within the slot of the bracket, the non-reduced thickness of the bolt not fitting within the slot.

15 8. A security device as claimed in any one of the preceding claims, wherein the attachment means is pivotally attached to the opening member by a hinged plate, the axis of the pivotal attachment being parallel and in close proximity to the edge of the opening member adjacent the 20 fixed member.

9. A security device as claimed in any one of the preceding claims, wherein the bolt is parallel to the plane of the opening member when the security device is in the 25 locked position.

10. A security device as claimed in any one of the preceding claims, wherein the securing means has spring biasing means to ensure that the bolt always engages the 30 bracket unless positively removed.

11. A security device as claimed in claim 10, wherein the securing means is pivotable to select or deselect said spring biasing means.

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12. A security device as claimed in any one of claims 3 to 10, wherein an alarm activator is provided on the attachment means which is activated by the pressure of the

projection from the bolt if the opening member is forced when the security device is in its limiting position.

13. A security device substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	<u>15</u> Application number GB 9418076.7
Relevant Technical Fields	Search Examiner M D WALKER
(i) UK Cl (Ed.N) E2A (ACME)	
(ii) Int Cl (Ed.6) F05C 17/16, 17/20, 17/22, 17/24, 17/12	Date of completion of Search 24 NOVEMBER 1995
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications.	Documents considered relevant following a search in respect of Claims :- ALL
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A: Document indicating technological background and/or state of the art.	&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X, Y	EP 0351345 A1	(RESEKO) Figures 1, 2, 3	X: 1, 2, 4 Y: 3
Y	US 4624492	(VIDAS) Figures 1, 2	3
A	US 4436331	(GLICKMAN ET AL) column 3, lines 16-61	1
A	US 4017104	(WALKER) Figure 2	1

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